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ABSTRACT

While the clinical literature frequently asserts that chronic illness negatively affects children's social development, data in support of such assertions are almost without exception obtained in clinical settings from children with chronic illness and their parents, without data from the school or community environment and without control or comparison data for non-chronically ill children. This study sought to identify whether children with diabetes are less accepted by classmates than are their healthy peers. Data were gathered from teachers; 19 students with diabetes, and 19 students without diabetes; school files; and medical records. Teachers rated social skills by completing a social skills rating scale. Students completed three sociometric measures of peer status. School files were examined to obtain number of school absences and national percentile rank scores for the 1987 statewide academic achievement testing. Medical records and parent reports provided the age of onset of diabetes. The results showed that children with diabetes did not differ significantly from healthy peers when compared on three peer status variables, social skills, and academic achievement variables. Additional data are needed to determine if these results hold for a larger sample, or are only a function of inadequate power to detect true differences between groups. (ABL)

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CHILDREN WITH DIABETES:
PEER STATUS, ACADEMIC ACHIEVEMENT,
AND BEHAVIOR PROBLEMS

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Introduction

The primary purpose of this study was to identify whether children with diabetes are less accepted by classmates than healthy peers. While the clinical literature frequently asserts that chronic illness negatively affects children's social development (Kleinberg, 1982; Morrow, 1985), data in support of such assertions are almost without exception obtained in clinical settings from children with chronic illness and their parents without data from the school or community environment and without control/comparison data for nonchronically ill children. Our interest was in assessing whether there are significant social status or social development differences between children with diabetes and their healthy peers, in their daily school classroom.

It is possible that some children with diabetes are at greater risk than their healthy classmates of having problems with peers. Several factors related to chronic illness such as school absences, social isolation, restrictions, and physical differences have been suggested to negatively impact the development and maintenance of positive peer relations (Fithian, 1984; Kleinberg, 1982; Morrow, 1985; Steinhauer, Mushin, & Rae-Grant, 1974; Travis, 1976; Weitzman, 1984). Children with chronic illness, their parents, and clinicians have reported that some children with chronic illness have

difficulty with peer relations (Allen, Affleck, Tennenk, McGrade, & Ratzan, 1984; Boyle, di Sant'Agnese, Sack, Millican & Kulczycki, 1976; Chesler & Barbarin, 1986; Phillips, Bohannon, Gayton, & Friedman, 1985; Pless & Satterwhite, 1975; Sterky, 1963; Tropaur, Franz, & Dilgard, 1970). Assessment of whether children with diabetes have greater peer relations problems than school age children in general must include sociometric data both on children with diabetes and a control group of healthy peers. However, we could identify no studies of children with chronic illness in general, or children with diabetes in particular, which used either sociometric procedures common to the study of peer status in the classroom or control group designs.

In the general population, levels of social skills and academic achievement are clearly related to peer status (Asher, 1983; Asher & Wheeler, 1985; Coie, Dodge, & Coppotelli, 1982; Dodge, 1983; French & Waas, 1985; Green, Forehand, Beck, & Vosk, 1980; Putallaz, 1983; Virtue & French, 1984; Vosk, Forehand, Parker, & Rickard, 1982; Wilson, 1985). Recent research investigating relationships among academic achievement, social skills, and peer status (Coie & Krehbiel, 1984; Wilson, 1987) suggests these three variables need to be examined in combination as well as independently. Development of social and academic skills in children with diabetes may be hindered by social isolation due to hospitalizations, homebound care, school absence, or restrictions to activity.

There is a lack of research investigating the degree to which social skills and academic achievement predict peer status in children who are chronically ill. This study examined whether levels of social skills and academic achievement of children with diabetes differed from those of classmates, as well as the relations between these variables in the chronically ill and nonchronically ill samples. In addition, the relations between age of onset or duration of diabetes and levels of social skills and academic achievement were examined.

The investigation of peer relations of children with chronic illness has previously been addressed through children's self-perceptions and parent report, without assessing how children with chronic illness are viewed by their peers. Information from the natural environment of the school setting is necessary to assess whether children with chronic illness differ significantly from healthy peers on variables affecting their daily activities. Data for this research were collected in the school setting with a sample of elementary school aged children with diabetes and a control group of healthy classmates.

Method

Data for this study were gathered from four sources, teachers, students, school files, and medical records. Teachers rated social skills by completing a social skills rating scale. Students completed three sociometric measures of peer status. Two sociometric rating scales identified

preferences for each same sex classmate in the areas of play and work. The third, a nomination measure, indicated three classmates considered to be a best friend. School files were utilized to obtain number of school absences and national percentile rank scores from the 1987 statewide academic achievement testing. Medical records and parent report provided the age of onset of diabetes.

Subjects

Subjects were 38 second through sixth grade children, 19 with diabetes mellitus and 19 without diabetes mellitus who live in a large metropolitan area of the Southwest United States. All children with diabetes chosen for participation in the study have a primary diagnosis of diabetes, with duration longer than one year. Participants with diabetes were located through the assistance of the Pediatric Endocrinology Unit of a local children's hospital and three local school districts. Once children with diabetes were identified, their parents were contacted and permission requested for their child's participation in the study. After permission for the 19 participants with diabetes was obtained, a control group of children without diabetes was selected. One control group participant was randomly selected from a list of same sex classmates from the school classroom of each child with diabetes. Control group participants in the study had been members of the classrooms since the start of the school year and had 1987 academic achievement scores in their

records. In addition, children requiring special education services for any of the following handicapping conditions were not included: speech/language handicaps, physical handicaps, and learning or emotional handicaps. A total of 3 second grade, 5 third grade, 4 fourth grade, 1 fifth grade, and 6 sixth grade classrooms in 15 schools were used in the study. The majority of schools were located in middle to upper socioeconomic level neighborhoods, with relatively low minority enrollments, resulting in an under-representation of minority and lower SES children in the sample. Teachers completed a social skills assessment for the two children from their classroom. Teachers were initially given a general description of the study, stating the purpose of the study was to investigate the peer relations of children, including the relationship between social skills, academic achievement, and peer status. After they had completed the social skills rating scale, teachers were provided with additional information regarding the comparative purpose of the study, i.e. differences between children with diabetes and healthy peers.

Measures

Sociometric Measures. Peer ratings were obtained from same sex students in classrooms of subjects with diabetes. Two roster and rating scales and one roster nomination were administered to obtain three measures of peer status. The rating scales (play with and work with) provided a measure of

overall acceptance as a playmate or work partner while the nomination measure provided an indication of friendship (Gresham, 1981). Students in all classrooms were requested to rate each same sex peer in terms of how much they would like to play with the child and how much they would like to work with the child. Use of general criteria such as work and play provide a measure of basic and stable aspects of social relationships among students (Gronlund, 1959). The play and work rosters had four rating categories of "not at all", "some", "much", and "very much" for each student to rate the children listed on the roster. The subjects' total score of all ratings for work or for play was divided by the number of students making the ratings to obtain a work with and play with peer status score. In addition, students were given a third roster and instructed to circle the names of three classmates they consider to be a best friend. Each subject received a peer status nomination score equal to the number of nominations received divided by the number of persons nominating. The rating and nomination scores were analyzed as three separate measures of peer status.

Social Skills Assessment. Teachers rated the social skills of two children from the classroom using a relatively brief measure which focuses on social skills necessary for developing and maintaining interpersonal relationships. The social skills rating scale consists of 50 positively stated items that assess the frequency with which a child exhibits

each specific skill. A global rating of a child's social competence is obtained by summing the score received on each specific skill. In addition, frequency ratings received on ten problem behaviors listed on the social skills rating scale were used to assess differences between groups on the frequency with which problem behaviors are exhibited in the school setting.

School and Medical Records. School records of all subjects were reviewed to obtain each child's 1987 scores on statewide academic achievement testing. The composite national percentile rank from the Iowa Tests of Basic Skills or the Stanford Early School Achievement Test was obtained for each subject. In addition, total number of school absences for 1987 were obtained for both diabetic and control subjects. Medical records of children with diabetes were reviewed to obtain the age of onset of diabetes. Where medical records were not available, parent report was used to specify age of onset.

Procedure

Requests for written consent to participate in this study were sent to parents of children with diabetes. Children participating in the study had a primary diagnosis of diabetes with duration longer than one year. School district administrative approval was obtained for those school districts in which diabetic subjects attended school. Parents of all same sex students within each classroom in the study

were sent written consent requests for their son or daughter to participate in the study. After consents were obtained, control subject selection was completed. Classroom data were collected from students for whom parental consent and child assent was received.

Teachers (N=19) each rated two students (one with diabetes and one control) on the social skills assessment. Within each classroom all students with permission to participate completed two rating scales (how much do you like to play with ___? and how much do you like to work with ___?) and one nomination (name three children you consider to be a best friend).

Achievement test data for all subjects were obtained from school records. National percentile rank for the composite score was used in data analysis as an estimate of academic achievement. In addition, school records were used to obtain yearly number of school absences for all subjects.

Detailed procedures are available from the first author.

Results

Descriptive Data

The purpose of this study was to investigate whether children with diabetes differ from healthy peers on three peer status measures (play ratings, work ratings, and best friend nominations), on measures of social skills and academic achievement, and on number of school absences. Means and standard deviations by group for the six variables are

presented in Table 1. For the diabetic group, means and standard deviations for age of onset and duration of illness are presented in Table 2. Table 3 presents the participants' mean age by group and grade.

Group Differences

A univariate analysis of difference between means was conducted with a t -test for each major variable. To control for type I error with multiple t -tests, an experiment-wise type I error probability of .15 was evenly distributed over the six t -tests, with significance levels for each test set at $p = .025$. Table 4 presents the results of the one-tail t -tests. Even though all of the group means differed in the hypothesized direction, none of the six tests was significant at the .025 level. However, differences between group means approach significance on number of days absent ($p < .05$) and academic achievement ($p < .06$). For this study, caution must be exercised in not hastily rejecting the possibility of differences between group means on academic achievement and absences since the experiment-wise type II error probability for this study is greater than .99.

Additional Data Analyses

Tables 5 and 6 present Pearson product-moment correlation coefficients for variables in the study. Correlations between achievement and absences were significantly different ($p < .05$) for the diabetic and control groups (r for control = .36; r for diabetic = -.46). Examination of the scatterplot

for achievement and absence by group shows that the vast majority of children in both groups were in the average to above average range of academic achievement and were seldom absent. However, the diabetic group had 5 subjects with academic achievement scores more than one standard deviation below the groups' combined mean, while there were no control subjects with scores this low. Four diabetic subjects with low academic achievement also had absences greater than one standard deviation above the groups' combined mean (see Tables 7 and 8). Four performance categories were formed for a chi-square test of independence and a test of proportions. The categories were defined as scores greater than one standard deviation below the combined groups' mean, scores between -1 standard deviations and the mean, scores between the mean and +1 standard deviations, and scores more than one standard deviation above the combined groups' mean. Significant results ($p < .01$) were obtained on a test of the difference in proportion of subjects from each group with academic achievement scores greater than one standard deviation below the groups' combined mean. A chi-square test of independence between groups on academic achievement yielded nonsignificant results ($\chi^2 = 6.000$; $df = 3$; $p = .11$).

Each subject was rated on ten problem behaviors. Three categories were established for number of problem behaviors identified: no problem behaviors identified, one to two problem behaviors identified, three or more problem behaviors

identified. A chi-square test of independence between groups on distribution of subjects per category yielded nonsignificant results ($\chi^2 = 4.4$; $DF = 2$; $p = .11$). A test of proportions found that significantly more children with diabetes than controls ($p < .02$) were identified as exhibiting three or more problem behaviors.

Table 1

Means and Standard Deviations by Group for Peer Status
Measures, Social Skills, Academic Achievement, and Absences

Group	N	Play	Work	Nom	SS	AA	Ab
All	38	2.8 (.64)	2.7 (.61)	.40 (.31)	79.78 (15.46)	77.16 (17.01)	8.01 (7.78)
Diabetic	19	2.7 (.50)	2.6 (.50)	.35 (.28)	77.74 (16.54)	72.90 (19.48)	10.11 (8.41)
Control	19	2.9 (.76)	2.8 (.69)	.45 (.34)	81.21 (13.74)	81.42 (13.31)	5.81 (6.58)

Table 2

Means and Standard Deviations
for Onset and Duration in Months

	Onset	Duration
<u>M</u>	81.90	42.74
<u>SD</u>	(29.50)	(24.34)
<u>N</u>	19	19

Table 3
Mean Age by Grade and Group

	<u>Grade</u>				
	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
Diabetic	8-1	9-10	9-11	11-2	12-2
N	3	5	4	1	6
Control	8-4	9-3	10-3	10-9	12-2
N	3	5	4	1	6

Table 4
One Tail t-Tests and Effect Size for Diabetic and Control Groups

<u>Test</u>	<u>t</u>	<u>df</u>	<u>p</u>	<u>Effect</u>
Social Skills	- .70	36	.24	.22
Academic Achievement	-1.58	36	.06	.50
Absence	1.73	35	.05	.55
Play	- .83	36	.20	.31
Work	-1.26	36	.11	.33
Nomination	-1.05	36	.15	.32

Table 5

Correlation Matrix by Group for Social Skills, Academic Achievement, Absences, Play, Work, and Nomination

	SS	AA	Ab ^a	Play	Work	Nom
SS						
All	-					
Diabetic	-					
Control	-					
AA						
All	.32*	-				
Diabetic	.51**	-				
Control	-.06	-				
Ab						
All ^a	-.10	-.23	-			
Diabetic	-.04	-.46*	-			
Control ^a	-.10	.36	-			
Play						
All	.43**	.11	-.15	-		
Diabetic	.30	.24	-.13	-		
Control	.56**	-.06	-.14	-		
Work						
All	.49***	.16	-.28*	.82***	-	
Diabetic	.52**	.25	-.37	.74***	-	
Control	.49*	-.01	-.15	.85***	-	
Nom						
All	.37**	.20	-.15	.69***	.71***	-
Diabetic	.30	.31	-.08	.59**	.70***	-
Control	.42*	-.01	-.18	.74***	.70***	-

^aData for one subject not available.

*p < .05 **p < .01 ***p < .001

Table 6

Correlation Matrix by Onset and Duration for Social Skills,
Academic Achievement, Absence, Play, Work, and Nomination

	SS	AA	Ab ^a	Play	Work	Nom
Onset	.10	.09	-.23	-.13	.09	-.17
Duration	-.00	.05	.32	-.06	-.19	.19

Note. All correlations are nonsignificant.

^aData for one subject not available.

Discussion

We examined the social and academic skills of nineteen children with diabetes and a comparison group of healthy peers. This study was unique in that data were collected in the subjects' school setting, from peers and teachers with whom subjects interact on a daily basis, and the comparison group was comprised of randomly selected same sex peers from the same classroom. Other researchers have gathered information on children with diabetes from teachers or peers or school records, but none has combined all three sources to form a composite profile of a group of children with diabetes and compared it to the profile of a group of healthy classmates. Although the hypotheses were not supported, the data do provide a clear description of these two groups. The sample size was quite small; however, relationships among variables and differences in those relationships between the groups suggest trends which may guide future research with students with diabetes. Additional data collection will be necessary to determine whether the patterns observed in this small sample will be supported in a larger sample.

The literature suggests clearly that some children with chronic illness experience difficulty in the areas of peer relations, academic achievement, or social skills. However, there has been little research which specifically addresses the degree to which these problems are evidenced in any illness group or whether the problems are any more prevalent

for children with an illness than for healthy peers. In the small sample studied here, children with diabetes did not differ significantly from healthy peers when compared on three peer status variables, social skills, and academic achievement variables. Additional data is needed to determine if these results hold for the larger sample, or are only a function of inadequate power to detect true differences between groups. Differences observed in this study are small, but are consistently in the predicted direction.

One variable that appears to differentiate children with diabetes from healthy peers, is the number of school absences. This result is consistent with the data reported in the literature and is a logically anticipated result. A second variable for which differences approached significance was academic achievement. The mean academic achievement national percentile rank score for the diabetic group was 8 points lower than the control group mean score ($p < .06$). A comparison of mean age per grade between the two groups shows little difference, suggesting that although the students with diabetes may be somewhat lower in academic achievement, they are not falling behind age mates in school grade placement. It is anticipated that with other things remaining equal, expansion of the data would show significant group differences on the variables of absence and academic achievement.

Academic achievement studies suggest some children with chronic illness have problems in academics. Research with

healthy populations suggest that absences have a negative relationship with academic achievement. We examined the relationship between absences and academic achievement and saw that within both groups, most students had average to above average achievement and few absences. However, within the diabetic group, 26% (5/19) had academic achievement scores more than one standard deviation below the combined groups' mean. There were no control subjects with academic achievement scores in this low range. Comparison of the frequency of obtained academic achievement scores between the two groups indicates that significantly more children with diabetes than controls had academic achievement scores more than one standard deviation below the combined groups' mean. In addition, four of the five low achievers from the diabetic group had absences one standard deviation above the combined groups' mean number of absences. These students from the diabetic group with low academic achievement and many absences clearly differentiate the diabetic group from the control group. The relationship of low academic achievement and many absences was not apparent in the control group. A closer examination of subsets of individuals with clearly different patterns of relationships may be possible with a larger sample.

It was hypothesized that age of onset would have a significant positive correlation with both social skills and academic achievement. These hypotheses were intended to test

the assertion that early age of onset interrupts normal development (Holmes & Richman, 1985; Kleinberg, 1982; Travis, 1976; Weitzman, 1984). Results of this study suggest that there is no direct positive relationship between a child's age at diagnosis of diabetes and later attainment of social or academic skills. If age of onset has a significant relationship with social or academic skills, it may be influenced by some combination of factors including severity, control of symptoms, activity restrictions, number of hospitalizations, or other variables not included in this analysis. Duration of diabetes was not significantly related to other major variables. Age of onset and duration were analyzed across age groups. An increased sample size would allow analyses of relationships among variables within different age groups, between age of onset groups, or between duration groups.

Differences in correlations between social skills and peer status and academic achievement and peer status for the two groups were examined to determine if these variables relate differently for children with diabetes than healthy peers. Correlations between social skills and peer status and between academic achievement and peer status did not differ significantly between the diabetic and control group. Although for both groups peer status was more highly related to social skills than to academic achievement, the data suggest that academic achievement scores may improve the

prediction of peer status for the diabetic group more than for the control group. The data also suggest that absence is a negative predictor of peer status for both groups. The selection of playmates, workmates, and friends is related to number of absences. These preliminary data suggest trends in relationships among variables and between groups. Academic achievement and absence are variables which appear to have different relationships with the diabetic than the control group. This study suggests there may be some students with diabetes who are having problems in multiple areas, and academic achievement scores and number of absences may be useful variables for the identification of these students.

Social skills and academic achievement were more closely related for the diabetic group than for the control group, though the difference between groups did not reach significance. The control group had a smaller range of scores on both measures and several individuals received top scores on both measures. If the control group had shown the variability in scores seen in the diabetic group, the correlation between social skills and academic achievement might have been greater. An analysis of the scatterplot for the diabetic group indicates that three of the five subjects with low academic achievement and high absences also have low social skills ratings. There were no control subjects who fell in the region of low achievement and low social skills (low being defined as more than one standard deviation below

the total group mean). An analysis of the proportion of children rated by teachers as exhibiting problem behaviors revealed significantly more children with diabetes than controls were identified as having three or more problem behaviors. Of the five children with diabetes who had high absences and low academic achievement, three had three or more problem behaviors identified and two had one or two problem behaviors identified. This result suggests that further study is needed of the possibility that some children with diabetes are having more difficulty than peers in multiple areas of functioning within the school setting.

In summary, results for this sample do not support the hypothesis that children with diabetes are more likely than their healthy peers to have difficulty with peer relations, social skills, or academic achievement. Rather than any one variable having significant influence in the prediction of group membership, the results suggest that patterns of relationships must be considered. When individual cases are examined for relationships between peer status, achievement, and social skills, a subset of children having difficulty in all areas emerges. This finding is consistent with suggestions that problems in these areas exist for some children with chronic illness, but not all (Johnson, 1980; Kleinberg, 1982; Schlieper, 1985; Weitzman, 1984). That is, there may be a select group who consistently score lower in all areas, bringing down the mean for the diabetic group, and

making the group appear to be lower overall. Continued data collection is necessary to see if these patterns hold true in a larger sample. If these relationships hold, future research should focus on identifying which children with diabetes have difficulty across areas. Studies must capture the complex relationships of social and academic development with factors associated with diabetes such as severity, number and types of illness episodes, general stress response to diabetes, treatment regimens, activity and dietary restrictions, etc.

Information on factors directly related to diabetes is needed to explore why some children with diabetes are not doing as well as healthy peers or as the majority of the children with diabetes. This knowledge is important for a better understanding of the effects diabetes has on children. While general conclusions about group differences can only be made from a larger sample, it is safe to say from the present data that the majority of children with diabetes do not differ significantly from age-mates in peer status, social skills, or academic achievement.

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